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Preface

Engineering of Functional Interfaces

Dear colleagues,

On the following pages you will find a topical section with a series of 30 selected articles covering recent trends in the "Engineering of Functional Interfaces". This seminal domain is at the touching point between classical solid-state physics and the tremendously growing field of nanotechnology. In the past few years, this field is governing novel trends in the formerly classical field of physics, chemistry, biology and material sciences. Nowadays, nanotechnology is combining all those aspects forming an "interface" to the field of natural sciences. This trend is demanding the education of a new generation of researchers with cross-disciplinary talents and interests. In addition, numerous device applications in the field of chemical sensors and biosensors and a rich variety of fundamental phenomena originate at solid–gas, solid–liquid, and solid–solid interfaces, some of them including nanotechnological aspects as well.

The topical section of this special issue starts with a tutorial about 'The scanning force microscope in bacterial cell investigations' by C. Müller and C. Ziegler, where one of the most important analytical tools in this field is discussed. The first section of the series is focusing on the preparation of nanostructures based on metals and their alloys. The second section is devoted to device applications in the field of chemical- and biosensors. An especially important aspect here is the implementation of functional interfaces in complex analytical systems, in which sensitive layers play a crucial and enabling role. In the third section, the interfaces between solid and biological systems are discussed while some of these studies are using the analytical techniques described in the tutorial article. Other approaches take benefit on novel analytical techniques for the study and characterization of functional surfaces and interfaces, highlighting, in particular, non-destructive optical and electrochemical concepts. The fourth section focuses on the preparation of heterostructures and thin films, ending with an article that is discussing the aspect of engineering novel functions to surfaces in a chemical sensor approach.

In conclusion, we believe that this topical section on "Engineering of Functional Interfaces" gives an up-to-date cross section of various important facets of functional interfaces, ranging from fundamental aspects of nanotechnology, material sciences and surface physics to the broad impact on novel device concepts in the field of chemical and biochemical sensing.

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